

Technical Memorandum

Significant Phosphorus Point Sources in the Marshyhope Creek Watershed

EPA requires that Total Maximum Daily Load (TMDL) allocations account for all significant sources of the impairing pollutant. The TMDL analysis for Marshyhope Creek addresses total phosphorus (TP) loads during low-flow conditions (May – October). This technical memorandum identifies, in detail, the significant surface water discharges of TP used as modeling input when computing the TMDL.

Two viable sets of point source loads are given as conceptual values. The first set, Table 1A, was used to compute the TMDL. The second set, Table 2, represents an alternative scenario, which is consistent with the TMDL.

Table 1A provides the point source phosphorus effluent inputs used in the water quality model to determine the maximum phosphorus load that Marshyhope Creek can accept during low-flow conditions. Figures A42-A49 in Appendix A corresponds to the loads shown in this table. The water quality model requires additional information about other substances associated with point source effluents. Supplemental information for these other substances, as well as phosphorus, is shown in Table 1B.

Table 1A
Phosphorus Loads Attributed to Significant Point Sources Used to Compute the Low-Flow TMDL^a (May – October)

Point Source Name	Permit Number	TP Load		Flow		Concentration
		lb/month	kg/day	mgd	m ³ /s	mg/l
Hurlock^b	MD0022730	270	4.09	1.5	0.0657	0.72
Future Allocation @ Hurlock	N/A	90	1.36	0.5	0.0219	0.72
Federalsburg	MD0020249	135	2.04	0.75	0.0329	0.72
Col. Richardson High School	MD0055522	10	0.155	0.011	0.0005	3.72
TOTAL	N/A	505	7.65	2.761	0.1210	N/A

^a These loadings correspond to the third model Scenario in the Draft TMDL Total Maximum Daily Load of Phosphorus for Marshyhope Creek, Dorchester and Caroline Counties, November 2000.

^b This allocation scenario assumes a 2.0 mgd discharge to Wrights Branch, 1.5 mgd from the WWTP (or other point source dischargers at that location) and 0.5 as a future allocation. MDE acknowledges that the Dorchester County Water and Sewer Plan indicates a 2.0 mgd planning capacity for Hurlock; however, 1.5 mgd was used as the waste load allocation for Hurlock (WLA = 270 lb/mo) and the future allocation of 0.5 mgd reflects pending plant upgrade plans. If at such a time Hurlock proposes a May to October 2.0 mgd discharge, MDE will adjust the allocations within the bounds of the TMDL.

Table 1B
Additional Point Source Loading Assumptions for Low Flow TMDL

Parameter	Hurlock	FA @ Hurlock	Federalsburg	Col. Richardson High School
Kg/day^c				
CBOD	141.94	47.31	95.0	0.22
Effluent DO	5 mg/l	5 mg/l	5 mg/l	6 mg/l
NH₃	6.00	2.00	3.01	0.11
ON	57.85	19.28	28.92	0.02
NO₂₋₃	38.93	12.98	19.46	1.12
PO₄	1.99	0.66	0.99	0.13
OP	2.1	0.70	1.05	0.025
Flow (m³/s)	0.0657	0.0219	0.0329	0.0005
Total Nitrogen	103.78	32.46	51.39	1.26
Total Phosphorus	4.09	1.36	2.04	0.155

NOTE: This table is supplied for those who wish to assess the WASP modeling. Thus, metric units are reported to facilitate such comparison. English units are used in the other, less technical tables to be consistent with reporting traditionally used to communicate with stakeholders in Maryland.

FA @ Hurlock = Future Allocation introduced into the waterbody at the location of Hurlock's present discharge point.

c. 1 kg = 2.2 lb Note that dissolved oxygen (DO) is expressed in milligrams per liter.

Table 2, on page 3, provides another viable set of point source allocations, which are consistent with the low-flow TMDL. Under this scenario, it is assumed that land application will occur for at least six months, May – October, the period for which the low-flow TMDL was computed. This would allow reallocation of the load as indicated in Table 2.

It should be noted that various other point source allocations are feasible within the bounds of the TMDL. Actual effluent limits and related permit conditions will be established at the time of permit issuance or renewal and will be based upon conditions present at that time, as reflected in population projections, infrastructure needs, and appropriate concentrations and loadings needed to assure the maintenance of water quality standards.

Nonpoint sources were estimated on the basis of observed in-stream data. Thus, it is not possible to show a distribution between different land uses. The nonpoint source loads that were used in the model account for both "natural" and human-induced components. The Maryland Department of the Environment (MDE) expressly reserves the right to allocate the TMDLs among different sources in any manner that is reasonably calculated to achieve water quality standards.

Table 2
Alternative Allowable Phosphorus Loads Attributed to Significant Point Sources Under the
Low-Flow TMDL (May – October)

Point Source Name	Permit Number	TP Load		Flow		Concentration
		<i>lb/month</i>	<i>kg/day</i>	<i>mgd</i>	<i>m³/s</i>	<i>mg/l</i>
Hurlock^d	MD0022730	0	0	0	0	N/A
Future Allocation @ Hurlock^e	N/A	113	1.7	--	--	--
Federalsburg	MD0020249	375	5.7	0.75	0.0329	2.0
Col. Richardson High School	MD0055522	17	0.25	0.011	0.0005	6.0
Total P Load →		505	7.65			

- d. Assumes land application of treated waste will not produce a phosphorus load to Marshyhope Creek. The volume of spray irrigation would accommodate the total of $1.5 + 0.5 = 2.0$ mgd flow at Hurlock, expressed in Table 1A.
- e. This table represents an alternative to the scenario shown on table 1A. Therefore, to be consistent with the TMDL point source total loads, a future allocation is assigned at Hurlock. The flow and phosphorus concentration associated with this future load will be determined according to the needs at the time where an additional surface discharge from the plant is to be implemented and not to exceed the maximum allowable load.